

**Linda Birnbaum's Testimony before the
Subcommittee on Children's Health Committee
on Environment and Public Works**

August 3, 2010

Chairman Klobuchar, Chairman Boxer, and Senator Udall. I'm pleased to present testimony today on research related to neurodevelopment disorders and to specifically discuss if environmental exposures are linked to the development of autism spectrum disorders. My name is Linda Birnbaum. I'm the director of the National Institute of Environmental Health Sciences of the National Institutes of Health and the director of the National Toxicology Program of the Department of Health and Human Services. Scientists have made considerable progress in understanding how the brain and nervous system grow and function. It is becoming clear that neurodevelopmental disorders, such as autism spectrum disorders [ASD], attention deficit hyperactivity disorder [ADHD], and learning disorders are likely due to a complex interplay of both genetics and the environment. Our research indicates that environmental exposures, including low-dose exposures, and lifestyle choices, before a baby's birth, and during early childhood, do have an effect on the developing brain. Autism spectrum disorders are developmental conditions that have increased in U.S. children in the past several years. And, NIEHS has significantly increased our funding this year to \$9.3 million. I am also an active member of the Interagency Autism Coordinating Committee – a group of federal agencies, autism advocates, and parents who plan and coordinate a research agenda. Our two largest efforts on autism are the EARLI Study and CHARGE. In the EARLI Study, researchers at the Drexel University, University of California, and Johns Hopkins University are studying mothers who already have one child with autism and who are pregnant again. This study is one of the largest studies of its kind. It will follow 1200 mothers, during their pregnancy, and their new babies until the age of 3, to identify prenatal and postnatal exposures that may be linked to autism. The CHARGE study, which you'll hear much more about from Dr. Pessah, which is coordinated by the NIH/NIEHS/EPA Children's Centers at University of California, Davis, is looking at a wide range of environmental exposures and their effects on early neurodevelopment. This study is following more than 1600 children in California from three groups – children with autism, children with other developmental delays, and normally developing children. So far, the most striking findings relate immune system alterations in children with autism which points to the need for further study of the immune and nervous systems in the etiology of autism spectrum disorder. It's also important to note that the CHARGE study found no difference in mercury levels between children with autism and normally developing children. I'm happy to report that the American Recovery and Reinvestment Act [ARRA] allowed NIH to increase its support for autism research. Our funding is being used to study air pollution; polyfluoroalkyl compounds, better known as PFCs and PFOAs – the most commonly ... and PFAS ... the ones we think about; endocrine disrupting chemicals, smoking; alcohol use; medication; and infections as potential risk factors for autism. The work we fund on autism and ASD is an important part of our overall investment in children's neurological development, which totaled more than \$29 million last year, almost \$18 million from the regular NIEHS appropriation, plus \$11.5 million in ARRA funds. Development of the nervous system begins in the womb and extends throughout childhood. During periods of rapid development, the brain is vulnerable. Even small changes in

the timing of critical development events can have major consequences for brain structure and function. We call these critical developmental periods, windows of susceptibility, during which different chemicals can affect the brain in specific and damaging ways. For example, the amount of lead that is toxic to an infant is much less than the amount that would be toxic for an adult. So, infancy, in this case, is a window of susceptibility. Many studies have shown that mercury is also a developmental neurotoxicant. And, studies in Bangladesh have found that arsenic and manganese in drinking water are associated with decreases in intelligence. But, metals are not the only toxic agents to affect IQ, learning, and memory. A study published last year from Columbia University showed that a mother's exposure to PAHs, released from burning fossil fuels and tobacco, can adversely affect a child's IQ. The IQ scores of children exposed, in utero, to high levels of PAHs, were almost 5 points lower than those of less exposed children. In another report, Columbia University examined prenatal exposure to a common flame retardant, PBDEs. Cord blood specimens were analyzed for selective flame-retardant chemicals and the same children were examined for neurodevelopment at ages 1, 2, 3, 4 and 6. The research showed that these children, who had higher blood concentrations of flame retardants, scored lower on tests of mental and physical development. In addition to effects on learning, these same chemicals can also affect behavior. Early lead exposure has been associated with aggressive behavior at different age levels from toddler to adolescent. Researchers at our Cincinnati Children's Center found that childhood exposure to lead, and prenatal exposure to tobacco, are risk factors for ADHD, possibly accounting for one-third of the cases in U.S. children. A recent study from Mt. Sinai's Children's Environmental Health Study found that increased concentration of phthalates, in the mothers during pregnancy, were associated with increased aggression, as well as conduct problems, attention problems, and depression in the children. Pesticides are also being investigated in relation to ADHD. Our Harvard Center has just released a report showing an association between exposure to organophosphate pesticides and development of ADHD. In summary, environmental influences on brain development, behavior, and other neurological outcomes of public health concern are a rapidly growing area of environmental health sciences and a high priority for NIEHS. We believe that our research will advance our understanding of these conditions, including autism, providing new information for prevention and treatment for children. Thank you for the opportunity to testify and I'd be happy to answer questions.